

Chapter 3 Questions

2. Pick any number. Add 4 to it and then double your answer. Now subtract 6 from that result and divide your new answer by 2. Write down your answer. Repeat these steps with another number. Continue with a few more numbers, comparing your final answer with your original number. Is there a pattern to your answers?

7. Choose any number. Double it. Subtract six and add the original number. Now divide by three. Repeat this process with other numbers, until a pattern develops. By using a variable such as x in place of your number, show that the pattern does not depend on which number you choose initially.

10. Simplify $x + 2 + x + 2 + x + 2 + x + 2 + x + 2 + x + 2 + x + 2 + x + 2 + x + 2$.

5. Here is another number puzzle: Pick a number, add 5 and multiply the result by 4. Add another 5 and multiply the result by 4 again. Subtract 100 from your result and divide your answer by 8. How does your answer compare to the original number? You may need to do a couple of examples like this until you see the pattern. Use a variable for the chosen number and show how the pattern holds for any number.

2. For each of the following, find the value of x that makes the equation true. The usual way of wording this instruction is *solve for x* :

(a) $2x = 12$

(b) $-3x = 12$

(c) $ax = b$

8. Solve each of the following equations for x :

(a) $16x + 7x = 46$

(b) $12x - 6x = 3$

(c) $ax + bx = 10$

(d) $px - qx = r$

5. Because $12x^2 + 5x^2$ is equivalent to $17x^2$, the expressions $12x^2$ and $5x^2$ are called *like terms*. Explain. Why are $12x^2$ and $5x$ called *unlike terms*? Are $3ab$ and $11ab$ like terms? Explain. Are $12x^2$ and $5y^2$ like terms? Explain. Are $12x^2$ and $12x$ like terms? Explain.

6. In each of the following, use appropriate algebraic operations to remove the parentheses and combine like terms. Leave your answers in a simple form.

(a) $x(x + 5) + 2(x + 5)$ (b) $2x(5x - 2) + 3(5x - 2)$ (c) $5m(3m - 2n) + 4n(3m - 2n)$

8. Jess has just finished telling Lee about learning a wonderful new algebra trick: $3 + 5x$ can be simplified very neatly to just $8x$, because $a + bx$ is the same as $(a + b)x$. Now Lee has to break some bad news to Jess. What is it?

12. Solve $9x + 2 = \frac{3}{4}(2x + 11)$.

5. During a recent episode of *Who Wants to Be a Billionaire*, your friend Terry called you, needing help with solving the equation $5x + 1 = 2x + 7$. Write down the step-by-step instructions you would give Terry over the phone.

9. Often it is necessary to rearrange an equation so that one variable is expressed in terms of others. For example, the equation $D = 3t$ expresses D in terms of t . To express t in terms of D , divide both sides of this equation by 3 to obtain $D/3 = t$.

(a) Solve the equation $C = 2\pi r$ for r in terms of C .

(b) Solve the equation $p = 2w + 2h$ for w in terms of p and h .

(c) Solve the equation $3x - 2y = 6$ for y in terms of x .

1. Temperature is measured in both Celsius and Fahrenheit degrees. These two systems are of course related: the Fahrenheit temperature is obtained by adding 32 to $9/5$ of the Celsius temperature. In the following questions, let C represent the Celsius temperature and F the Fahrenheit temperature.

(a) Write an equation that expresses F in terms of C .

(b) Use this equation to find the value of F that corresponds to $C = 20$.

(c) On the Celsius scale, water freezes at 0° and boils at 100° . Use your formula to find the corresponding temperatures on the Fahrenheit scale. Do you recognize your answers?

(d) A quick way to get an approximate Fahrenheit temperature from a Celsius temperature is to double the Celsius temperature and add 30. Explain why this is a good approximation. Convert 23° Celsius the quick way. What is the difference between your answer and the correct value? For what Celsius temperature does the quick way give the correct value?

5. Solve for x : (a) $3x - 4 = 11$ (b) $-2x + 5 = -1$ (c) $ax + b = c$

5. Solve for x : (a) $2(x - 3) = 4$ (b) $-3(2x + 1) = 5$ (c) $a(bx + c) = d$